

Claims

We claim:

- 5 1. A multiple speed power transmission,
particularly for motor vehicles, comprising:
 an input;
 a first layshaft driveably connectable through a
first power path to the input, and supporting a first
10 pinion thereon;
 a clutch for alternately connecting and
disconnecting the input and first layshaft;
 a first coupler for releasably coupling the first
pinion and first layshaft;
15 a second layshaft driveably connected through a
second power path and a one-way drive connection to the
input, supporting a second pinion thereon;
 a second coupler for selectively releasably coupling
the second pinion and second layshaft; and
20 an output shaft supporting a gear thereon, said gear
being in meshing engagement with the first pinion and
second pinion.
2. The transmission of claim 1, wherein the first
25 coupler and second coupler are synchronizers.
3. The transmission of claim 1, wherein the first
coupler is a member of a group consisting of
synchronizers and dog clutches.
- 30 4. The transmission of claim 1, wherein the second
coupler is a member of a group consisting of
synchronizers and dog clutches.

5. The transmission of claim 1, wherein each of the first coupler and second coupler is a member of a group consisting of synchronizers and dog clutches.

5 6. The transmission of claim 1, wherein the one-way drive connection is a member of the group consisting of a one-way clutch, a sprag one-way clutch, a roller-one-way clutch, a mechanical diode, and a hydraulically actuated friction clutch having an engaged state wherein
10 the second layshaft and input are driveably connected and a disengaged state wherein the second layshaft and input are driveably disconnected.

7. The transmission of claim 1, wherein the clutch
15 is a friction clutch.

8. The transmission of claim 1, wherein:
the first layshaft is driveably connected to the input through the first power path comprising an input, a
20 third pinion supported on the input, and a third gear supported on the first layshaft in meshing engagement with said third pinion; and

the second layshaft is driveably connected to the input through the second power path comprising a fourth
25 pinion supported on the input, and a fourth gear supported on the second layshaft in meshing engagement with said fourth pinion.

9 The transmission of claim 1, wherein:
30 the first layshaft is driveably connected to the input through a first power path comprising a third pinion supported on the input, and a third gear supported on the first layshaft in meshing engagement with said third pinion; and

35 the second layshaft is driveably connected to the input through a second power path comprising a fourth

pinion supported on the input, a fourth gear supported on the second layshaft in meshing engagement with said fourth pinion.

5 10. The transmission of claim 8, wherein the first power path produces a first speed ratio, and the second power path produces a second speed ratio that is less than the first speed ratio.

10 11. The transmission of claim 9, wherein the first power path produces a first speed ratio, and the second power path produces a second speed ratio that is less than the first speed ratio.

15 12. The transmission of claim 8, wherein the first power path produces a first ratio of the rotational speeds of the first layshaft and input shaft, and the second power path produces a second ratio of the rotational speeds of the second layshaft and input that
20 is less than the first speed ratio.

 13. The transmission of claim 9, wherein the first power path produces a first ratio of the rotational speeds of the first layshaft and input, and the second
25 power path produces a second ratio of the rotational speeds of the second layshaft and input that is less than the first ratio.

 14. A multiple speed ratio power transmission,
30 particularly for motor vehicles, comprising:
 an input;
 a first layshaft driveably connectable through a first power path to the input, supporting a first pinion and a first set of pinions thereon;
35 a clutch for alternately connecting and disconnecting the input and first layshaft;

a first coupler having a selectable coupling member supported for movement on the first coupler, the first coupler releasably coupling a pinion of the first pinion set and said first layshaft in response to movement of
5 the coupling member;

a second layshaft driveably connected through a second power path and a one-way drive connection to the input, supporting a second pinion and a second set of pinions thereon;

10 a second coupler having a selectable second coupling member supported for movement on the second coupler, the second coupler releasably coupling a pinion of the second pinion set and said second layshaft in response to movement of the second coupling member; and

15 an output supporting a gear thereon, said gear being in meshing engagement with the first pinion and second pinion, and further supporting a set of gears thereon, each gear of said set of gears being in meshing engagement with a pinion of the first pinion set and a
20 pinion of the second pinion set.

15. The transmission of claim 14, wherein the input is adapted for connection to a power source, and the output is adapted for connection to a load.

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16. The transmission of claim 14, wherein:

the first layshaft is driveably connected to the input through a first power path comprising an input shaft, a third pinion supported on the input shaft, and a
30 third gear supported on the first layshaft in meshing engagement with said third pinion; and

the second layshaft is driveably connected to the input by a second power path comprising a fourth pinion supported on the input, and a fourth gear supported on
35 the second layshaft in meshing engagement with said fourth pinion.

17. The transmission of claim 14, wherein:

the first layshaft is driveably connected to the input through a first power path comprising a third
5 pinion supported on the input, and a third gear supported on the first layshaft in meshing engagement with said third pinion; and

the second layshaft is driveably connected to the input through a second power path comprising a fourth
10 pinion supported on the input, a fourth gear supported on the second layshaft in meshing engagement with said fourth pinion.

18. The transmission of claim 16, wherein the first
15 power path produces a first speed ratio, and the second power path produces a second speed ratio that is less than the first speed ratio.

19. The transmission of claim 17, wherein the first
20 power path produces a first speed ratio, and the second power path produces a second speed ratio that is less than the first speed ratio.

20. The transmission of claim 16, wherein the first
25 power path produces a first ratio of the rotational speeds of the first layshaft and input shaft, and the second power path produces a second ratio of the rotational speeds of the second layshaft and input that is less than the first speed ratio.

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21. The transmission of claim 17, wherein the first power path produces a first ratio of the rotational speeds of the first layshaft and input, and the second power path produces a second ratio of the rotational
35 speeds of the second layshaft and input that is less than the first speed ratio.

22. The transmission of claim 14, further comprising:

primary pinion-gear pairs, the pinions of said
5 primary pairs being supported on, and spaced mutually
along the first layshaft, the gears of said primary pairs
being in engagement with the pinions of said primary
pairs, supported on, and spaced mutually along the
output; and

10 primary couplers connected to the first layshaft,
each primary coupler having a selectable coupling member
supported for movement on the corresponding primary
coupler, for releasably coupling a pinion of the primary
pinion-gear pairs and said first layshaft in response to
15 movement of said coupling member.

23. The transmission of claim 22, further comprising:

secondary pinions supported on, and spaced mutually
20 along the second layshaft, each secondary pinion being
engaged with a gear of a primary pinion-gear pair; and
secondary couplers connected to the second layshaft,
each secondary coupler having a selectable coupling
member supported for movement on a corresponding
25 secondary coupler for releasably coupling a secondary
pinion and said second layshaft in response to movement
of said coupling member.

24. The transmission of claim 22, further
30 comprising:

a reverse pinion supported on the first layshaft;
a reverse gear supported on the output; and
a reverse idler engaged with the reverse pinion and
reverse gear, and wherein a primary coupler driveably
35 connects the reverse pinion and the first layshaft

25. A multiple speed ratio power transmission,
comprising:
an input;
a first layshaft;
5 a second layshaft;
a first power path for transmitting power between
the input and first layshaft, and producing a first ratio
of a speed of the first layshaft and a speed of the
input;
10 a second power path for transmitting power between
the input and second layshaft, and producing a second
ratio of a speed of the second layshaft and speed of the
input; and
a clutch for releasably connecting the input and
15 first power path.

26. The transmission of claim 25, further
comprising:
a one-way drive connection between the second
20 layshaft and input.

27. The transmission of claim 25, wherein:
the first power path comprises a first pinion
driveably connected to the input, and a first gear
25 supported on the first layshaft in meshing engagement
with the first pinion; and
the second power path comprises a second pinion
driveably connected to the input, and a second gear
supported on the second layshaft in meshing engagement
30 with the second pinion.

28. The transmission of claim 27, further
comprising:
a one-way drive connection between said second
35 layshaft and the second gear.

29. The transmission of claim 27, wherein the first power path produces a first ratio of the speeds of the first gear and first pinion, and the second power path produces a second ratio of the speeds of the second pinion and second gear, the second ratio being less than the first ratio.

30. The transmission of claim 27, wherein:
the first power path produces a first ratio of a speed of the first layshaft and a corresponding speed of the input; and
the second power path produces a second ratio of a speed of the second layshaft and a corresponding speed of the input, the second ratio being less than the first ratio.